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Enzymatic hydrolysis of salmon frame proteins at different byproduct/water ratios and pH regimes

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PURPOSE OF THE ABSTRACT

The enzymatic hydrolysis of proteins is an interesting alternative to add value to the salmon frames by converting this by-product into protein hydrolysate and bones. The protein hydrolysates are recognized sources of bioactive peptides. In addition, bones can be transformed into a viable calcium source through nano milling. During the hydrolysis the mixing is favored by the addition of water, meanwhile, the cost is highly increased during the drying stage. The addition of alkali avoids the pH drop causing enzyme activity to decrease, meanwhile, the operation cost is increased. The evaluation of different by-product/water ratios was assessed using 50%, 75%, and 100% of ground salmon frames. The pH regimes were set up at controlled pH 8, initial pH 8 without control, and native initial pH 6.5 without control. The hydrolysis reactions were carried out at 55 °C in an agitated batch reactor using 13 AU subtilisin per kg salmon frame. Response variables were released alpha-amino groups, mass of soluble/insoluble fraction, and nitrogen extraction. The results showed that the released alpha-amino groups after 60 min of reaction decreased with the salmon frame concentration (Fig. 1). The hydrolysis without pH control allowed to avoid the use of alkali and control system but decreasing the production of amino groups at 68% of the controlled condition. The hydrolysis at high salmon frame concentration allowed to avoid the addition of water. However, the nitrogen recovery was 27.2, 45.8 and 49.1% at 60 min for 100%, 75%, and 50% of salmon frame for the controlled pH condition (Fig. 2). These results can be used to estimate the profitability of the process after considering the decrease in the operational cost and the effects on the product yield.

FIGURES

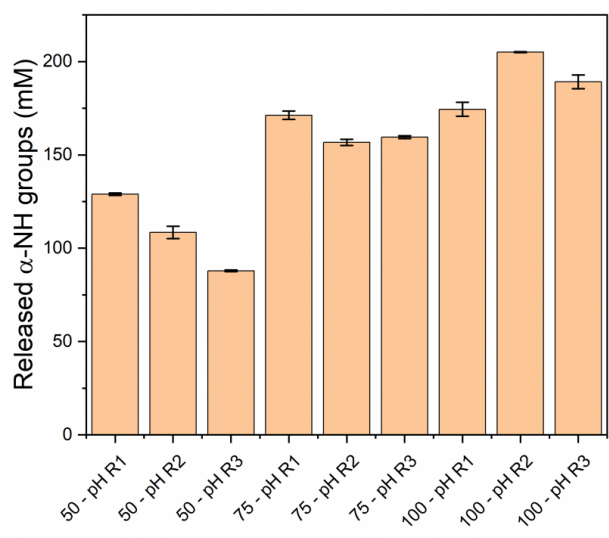


FIGURE 1

Released amino groups concentrations after 60 min of reaction for different byproduct/water ratios and pH regimes for the hydrolysis of salmon frame protein by subtilisine

pH regimes

R1: initial pH 8.0 controlled.

R2: initial pH 8.0 uncontrolled.

R3: initial pH 6.5 (native) uncontrolled.

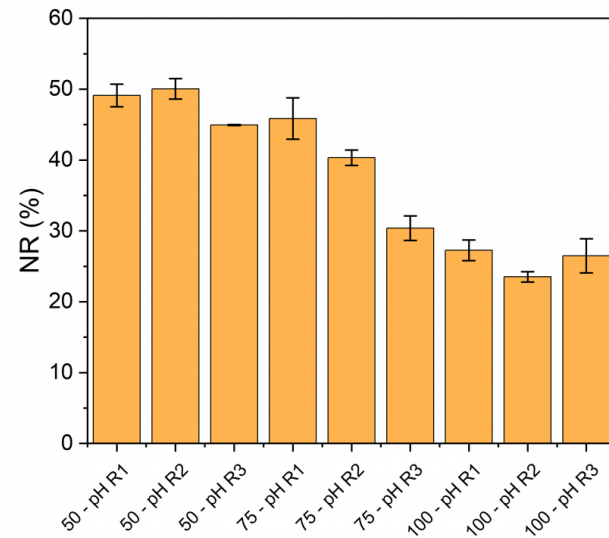


FIGURE 2

Nitrogen recovery of salmon frame protein at different byproduct/water ratio and pH regimes for the hydrolysis of salmon frame protein by subtilisin at 55°C.

pH regimes:

R1: initial pH 8.0 controlled.

R2: initial pH 8.0 uncontrolled.

R3: initial pH 6.5 (native) uncontrolled.

KEYWORDS

protein hydrolysis | byproduct proteolysis | salmon frame | high solid concentration

BIBLIOGRAPHY